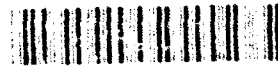


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21a NAME OF RESPONSIBLE INDIVIDUAL R. A. Bixler	21b TELEPHONE (include Area Code) (619) 553-1961	21c OFFICE SYMBOL Code 942

RECOVERY OF AN ADVANCED UNMANNED SEARCH SYSTEM
BY THE
ADVANCED TETHERED VEHICLE

Michael E. Neller
LCDR U.S. Navy

Deep Submergence Unit
NAS North Island
San Diego, CA. 92135

Robert A. Bixler
Project Engineer

Naval Ocean Systems Center
San Diego, CA. 92152

ABSTRACT

On 18 January 1991, a team from Naval Ocean System Center, (NAVOCEANSYSCEN) San Diego, CA. and Navy personnel from the Deep Submergence Unit Unmanned Vehicles Detachment (UMVDET) recovered Advanced Unmanned Search System (AUSS) using the Advanced Tethered Vehicle (ATV). AUSS had been undergoing testing in a Southern California operating area. This recovery marked a new era for the AUSS recovery using ROV assets.

INTRODUCTION

The Advanced Unmanned Search System (AUSS) is a free-descending/free-ascending search system with communication to and from the surface on acoustic channels only. Operational depths are 100 to 20,000 feet. There is normally no connection between the surface support craft and the AUSS vehicle. During normal operations, AUSS may descend to the bottom using its thrusters or descent weights, which are released by an acoustic command when the vehicle is on depth. After a dive is completed, ascent weights are designed to be released through an acoustic command or a backup corrosive release, which should release the ascent weights 20-30 hours after AUSS is launched.

The ATV is a self-contained, remotely operated vehicle designed to conduct underwater operations in water depths of 20,000 feet. ATV was built by NAVOCEANSYSCEN, Hawaii and at the time of this recovery, was in a joint test and evaluation phase with NAVOCEANSYSCEN, San Diego and Navy personnel from UMVDET.

RECOVERY

At 2000 on the evening of Thursday, 17 January 1991, the NAVOCEANSYSCEN Duty Officer received a call from the AUSS project manager aboard the MARSEA 15, which was at sea approximately 10 miles off the coast of Encinitas, CA. The MARSEA 15 is the support ship used by NAVOCEANSYSCEN for both AUSS and ATV operations (both were onboard). The AUSS vehicle was in the water at a depth of 550 feet and not responding to communications and recovery attempts. As a result, the AUSS vehicle was not under command; floating neutrally buoyant. Water depth was approximately 2500 feet. Although AUSS was being acoustically tracked using an Ultra-Short Baseline (USBL) navigation system, it was drifting south with the current. Besides the potential to lose track of the AUSS vehicle, there was no guarantee that the corrosive release for the ascent weights would work.

A request was relayed to the ATV project engineer for assistance in recovering the AUSS vehicle. Personnel from NAVOCEANSYSCEN and UMVDET were then mustered, while the NAVOCEANSYSCEN duty officer arranged to have a Torpedo Recovery Boat (TRB) provide transportation. The ATV operations team departed at 0400, Friday morning and arrived on scene at 0600.

Although NAVOCEANSYSCEN, ATV personnel were along, including the project test director, the actual ATV operations team was comprised exclusively of NAVY personnel (one officer and five enlisted). The test director's role was primarily to assure a smooth launch and recovery of ATV.

ATV was deployed with a transponder, which allowed it to be acoustically tracked with AUSS on the ultra-short baseline system. Utilizing the navigation display, which provided vehicle depth along with position, the ATV pilot closed AUSS while maintaining the vehicle in the same depth stratum. ATV's obstacle avoidance sonar, which is severely limited by it's very narrow beam width, was only used initially to confirm that the USBL navigation display was accurate. For the remainder of the operation, ATV was flown from the work package end, which has no sonar, but greater video capabilities and the force feedback manipulators. The ATV command and control system allows you to pilot the vehicle in either direction. It was felt that the most difficult part of this recovery would be bringing the manipulators to bear without losing visual contact with the AUSS vehicle. Not having to rotate the vehicle after visual acquisition would greatly enhance the chance for success.

AUSS, with its large size and white paint provided an excellent sonar and visual target. It could easily be seen at distances of 5-10 meters. However, getting hold of a free floating object was another matter. The slightest touch to AUSS could cause it to move and leave our field of view. Initially, attempts were made to get a wire noose around one of the propellers using a makeshift tool. On three attempts visual contact and proximity to AUSS was lost. On the last attempt, the noose was lost and the manipulator operator simply grabbed the fins on AUSS and brought the tail in over ATV's tool tray. Ascent was made slowly to the surface, where a swimmer attached a tagline to AUSS and it was subsequently recovered onboard. The entire recovery took a total of two and half hours.

NAVY CAPABILITIES

From a scientific aspect, this operation was significant in that it was a complex recovery of a free-floating object easily accomplished by ATV. In addition, Navy personnel demonstrated their ability to operate a state-of-the-art remotely operated vehicle. NWP 19-3 DEEP OCEAN SEARCH, INSPECTION, AND RECOVERY, a Naval Warfare Publication promulgated in the 70s and only recently under revision, discusses ROV operations in this manner: "Because of their developmental nature, these devices are not operated by fleet personnel. Skilled technicians and scientists who were instrumental in their design operate them." Anybody that believes this today does not understand ROVs or the outstanding capabilities of the sailors we have in the U.S. Navy, specifically the submarine force. Personnel at the UMVDET have distinguished themselves as professionals, capable of successfully conducting complex ROV operations. Other operations conducted as training evolutions using ATV have included Deep Ocean Transponder Recovery, laying small cables on the ocean bottom, and video survey of submerged wreckage. Experienced ROV pilots from Eastport International who have observed ATV operations were impressed by the skill and experience level of the UMVDET ATV pilots.

In the area of maintenance, Navy personnel have consistently proven their technical ability while maintaining the complex systems associated with ROVs. In a period of 12-18 months, under the supervision of NAVOCEANSYSCEN engineers, UMVDET sailors have performed virtually every maintenance item from thruster replacement to fiber optic cable re-termination. As with any equipment there will always be a need for contractor and manufacturer support to perform depot level maintenance, but the technical capability of today's sailor should not be underestimated. Certainly the major reason for the success that UMVDET has enjoyed with ATV is a result of the outstanding design and engineering support that NAVOCEANSYSCEN has provided.

The same professionalism and high standards of performance that are the norm in the submarine force are being transfused into deep submergence ROV operation. As we move into the 1990s I believe that the Navy will continue to prove its ability to operate and maintain ROVs with a proficiency never before seen.

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